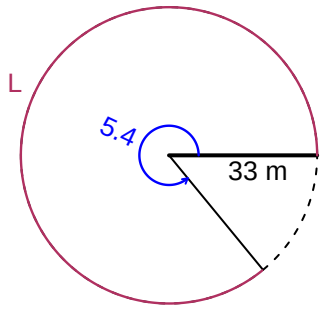
Name: Date:

# Trig Final (SLTN v621)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

### Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 33 meters. The angle measure is 5.4 radians. How long is the arc in meters?

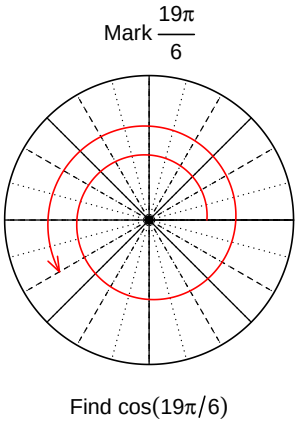



$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

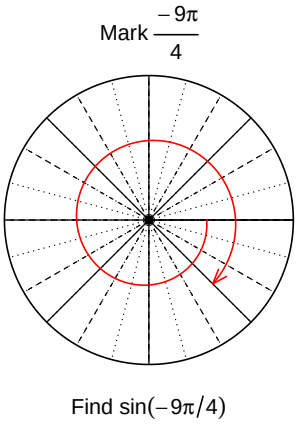
$L = 178.2$ meters.

### Question 2

Consider angles $\frac{19\pi}{6}$ and $\frac{-9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{19\pi}{6}\right)$ and $\sin\left(\frac{-9\pi}{4}\right)$ by using a unit circle (provided separately).




Find $\cos(19\pi/6)$




Find $\sin(-9\pi/4)$

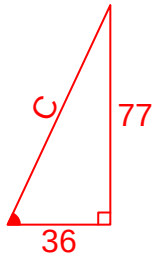
$\cos(19\pi/6) = \frac{-\sqrt{3}}{2}$

$\sin(-9\pi/4) = \frac{-\sqrt{2}}{2}$

**Question 3**

If $\tan(\theta) = \frac{77}{36}$, and $\theta$ is in quadrant III, determine an exact value for $\cos(\theta)$.

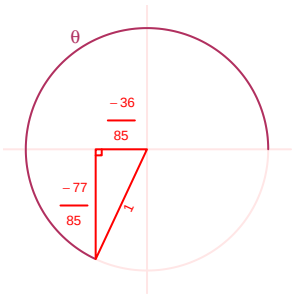
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.




Solve the Pythagorean Equation

$$36^2 + 77^2 = C^2$$
$$C = \sqrt{36^2 + 77^2}$$
$$C = 85$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.




$$\cos(\theta) = \frac{-36}{85}$$

**Question 4**

A mass-spring system oscillates vertically with a frequency of 2.24 Hz, an amplitude of 8.83 meters, and a midline at $y = 4.55$ meters. At $t = 0$, the mass is at the maximum height. Write an equation to model the height ($y$ in meters) as a function of time ($t$ in seconds).

Any of these equations would get full credit.

$$y = 8.83\cos(2\pi 2.24t) + 4.55$$

or

$$y = 8.83\cos(4.48\pi t) + 4.55$$

or

$$y = 8.83\cos(14.07t) + 4.55$$